

## 74V2G74

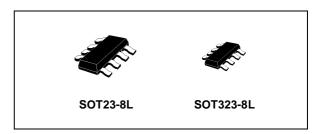
## SINGLE D-TYPE FLIP FLOP WITH PRESET AND CLEAR

- HIGH SPEED:
  - $f_{MAX} = 170 \text{ MHz (TYP.)}$  at  $V_{CC} = 5V$
- LOW POWER DISSIPATION:  $I_{CC} = 1 \mu A \text{ (MAX.)}$  at  $T_A=25^{\circ}\text{C}$
- HIGH NOISE IMMUNITY: V<sub>NIH</sub> = V<sub>NIL</sub> = 28% V<sub>CC</sub> (MIN.)
- POWER DOWN PROTECTION ON INPUTS
- SYMMETRICAL OUTPUT IMPEDANCE: |I<sub>OH</sub>| = I<sub>OL</sub> = 8 mA (MIN)
- BALANCED PROPAGATION DELAYS: t<sub>PLH</sub> ≅ t<sub>PHL</sub>
- OPERATING VOLTAGE RANGE: V<sub>CC</sub>(OPR) = 2V to 5.5V
- FUNCTION COMPATIBLE WITH 74 SERIES 74
- IMPROVED LATCH-UP IMMUNITY

#### **DESCRIPTION**

The 74V2G74 is an advanced high-speed CMOS SINGLE D-TYPE FLIP FLOP WITH PRESET AND CLEAR fabricated with sub-micron silicon gate and double-layer metal wiring C<sup>2</sup>MOS tecnology.

 $\frac{A}{Q}$  signal on the D INPUT is transferred to the Q and  $\frac{A}{Q}$  OUTPUTS during the positive going transition of the clock pulse.



#### **ORDER CODES**

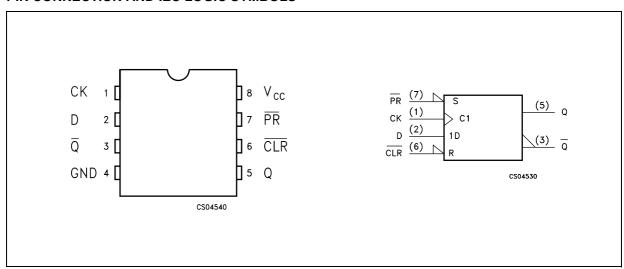
PACKAGE	T & R
SOT23-8L	74V2G70STR
SOT323-8L	74V2G70CTR

CLEAR and PRESET are independent of the clock and accomplished by a low setting on the appropriate input.

Power down protection is provided on all inputs and 0 to 7V can be accepted on inputs with no regard to the supply voltage. This device can be used to interface 5V to 3V.

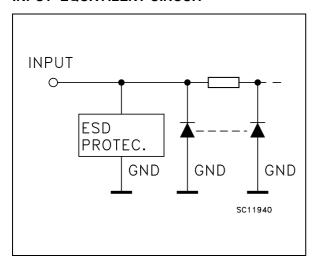
All inputs and outputs are equipped with protection circuits against static discharge, giving them ESD immunity and transient excess voltage.

#### PIN CONNECTION AND IEC LOGIC SYMBOLS



December 2001 1/13

## INPUT EQUIVALENT CIRCUIT



### **PIN DESCRIPTION**

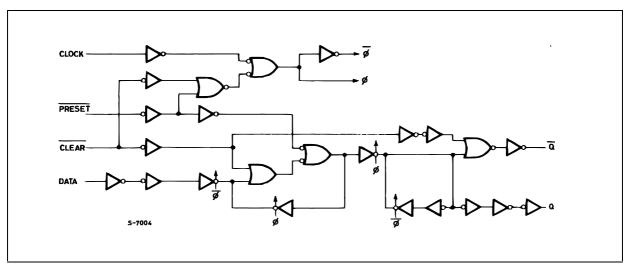
PIN No	SYMBOL	NAME AND FUNCTION
6	CLR	Asyncronous Reset - Direct Input
2	D	Data Input
1	СК	Clock Input (LOW to HIGH, Edge Triggered)
7	PR	Asyncronous Set - Direct Input
5	Q	True Flip-Flop Output
3	Q	Complement Flip-Flop Output
4	GND	Ground (0V)
8	V <sub>CC</sub>	Positive Supply Voltage

### **TRUTH TABLE**

	INP	UTS		OUTI	UTPUTS FUNCTION		
CLR	PR	D	СК	Q	Q	FUNCTION	
L	Н	Х	Х	L	Н	CLEAR	
Н	L	Х	Х	Н	L	PRESET	
L	L	X	X	Н	Н		
Н	Н	L		L	Н		
Н	Н	Н		Н	L		
Н	Н	Х		Q <sub>n</sub>	$\overline{Q}_n$	NO CHANGE	

X= Don't care

### **LOGIC DIAGRAM**



This logic diagram has not be used to estimate propagation delays

## **ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	-0.5 to +7.0	V
V <sub>I</sub>	DC Input Voltage	-0.5 to +7.0	V
V <sub>O</sub>	DC Output Voltage	-0.5 to V <sub>CC</sub> + 0.5	V
I <sub>IK</sub>	DC Input Diode Current	- 20	mA
I <sub>OK</sub>	DC Output Diode Current	- 20	mA
I <sub>O</sub>	DC Output Current	± 25	mA
I <sub>CC</sub> or I <sub>GND</sub>	DC V <sub>CC</sub> or Ground Current	± 50	mA
T <sub>stg</sub>	Storage Temperature	-65 to +150	°C
T <sub>L</sub>	Lead Temperature (10 sec)	300	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied

## RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	2 to 5.5	V
V <sub>I</sub>	Input Voltage	0 to 5.5	V
Vo	Output Voltage	0 to V <sub>CC</sub>	V
T <sub>op</sub>	Operating Temperature	-55 to 125	°C
dt/dv	Input Rise and Fall Time (note 1) ( $V_{CC} = 3.3 \pm 0.3V$ ) ( $V_{CC} = 5.0 \pm 0.5V$ )	0 to 100 0 to 20	ns/V

<sup>1)</sup>  $V_{\text{IN}}$  from 30% to 70% of  $V_{\text{CC}}$ 

## **DC SPECIFICATIONS**

	Parameter	1	Test Condition	Value							
Symbol		v <sub>cc</sub>		T,	<sub>A</sub> = 25°	C.	-40 to 85°C		-55 to	125°C	Unit
		(V)		Min.	Тур.	Max.	Min.	Max.	Min.	Max.	
V <sub>IH</sub>	High Level Input	2.0		1.5			1.5		1.5		
Voltage	3.0 to 5.5		0.7V <sub>CC</sub>			0.7V <sub>CC</sub>		0.7V <sub>CC</sub>		V	
V <sub>IL</sub>	Low Level Input	2.0				0.5		0.5		0.5	
Voltage	3.0 to 5.5				0.3V <sub>CC</sub>		0.3V <sub>CC</sub>		0.3V <sub>CC</sub>	V	
V <sub>OH</sub> High Level Output Voltage	2.0	I <sub>O</sub> =-50 μA	1.9	2.0		1.9		1.9			
	3.0	I <sub>O</sub> =-50 μA	2.9	3.0		2.9		2.9			
		4.5	I <sub>O</sub> =-50 μA	4.4	4.5		4.4		4.4		V
		3.0	I <sub>O</sub> =-4 mA	2.58			2.48		2.4		
		4.5	I <sub>O</sub> =-8 mA	3.94			3.8		3.7		
V <sub>OL</sub>	Low Level Output	2.0	I <sub>O</sub> =50 μA		0.0	0.1		0.1		0.1	
	Voltage	3.0	I <sub>O</sub> =50 μA		0.0	0.1		0.1		0.1	
		4.5	I <sub>O</sub> =50 μA		0.0	0.1		0.1		0.1	V
		3.0	I <sub>O</sub> =4 mA			0.36		0.44		0.55	
		4.5	I <sub>O</sub> =8 mA			0.36		0.44		0.55	
I <sub>I</sub>	Input Leakage Current	0 to 5.5	V <sub>I</sub> = 5.5V or GND			± 0.1		± 1		± 1	μΑ
Icc	Quiescent Supply Current	5.5	$V_I = V_{CC}$ or GND			2		20		20	μΑ

## AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f = 3ns$ )

		1	est Co	ondition				Value				
Symbol	Parameter	v <sub>cc</sub>	CL		Т	A = 25°	C	-40 to	85°C	-55 to	125°C	Unit
		(V)	(pF)		Min.	Тур.	Max.	Min.	Max.	Min.	Max.	
t <sub>PLH</sub>	Propagation Delay	3.3 <sup>(*)</sup>	15			6.7	11.9	1.0	14.0	1.0	14.0	
t <sub>PHL</sub>	Time CK to Q or Q	3.3 <sup>(*)</sup>	50			9.2	15.4	1.0	17.5	1.0	17.5	ns
		5.0 <sup>(**)</sup>	15			4.6	7.3	1.0	8.5	1.0	8.5	115
		5.0 <sup>(**)</sup>	50			6.1	9.3	1.0	10.5	1.0	10.5	
t <sub>PLH</sub>	t <sub>PHL</sub> Time PR or CLR to Q or Q	3.3 <sup>(*)</sup>	15			7.6	12.3	1.0	14.5	1.0	14.5	
t <sub>PHL</sub>		3.3 <sup>(*)</sup>	50			10.1	15.8	1.0	18.0	1.0	18.0	no
		5.0 <sup>(**)</sup>	15			4.8	7.7	1.0	9.0	1.0	9.0	ns
		5.0 <sup>(**)</sup>	50			6.3	9.7	1.0	11.0	1.0	11.0	
t <sub>W</sub>	t <sub>W</sub> CK Pulse Width HIGH or LOW	3.3 <sup>(*)</sup>			6.0			7.0		7.0		ns
		5.0 <sup>(**)</sup>			5.0			5.0		5.0		115
t <sub>W</sub>	PR or CLR Pulse	3.3 <sup>(*)</sup>			6.0			7.0		7.0		ns
	Width LOW	5.0 <sup>(**)</sup>			5.0			5.0		5.0		115
t <sub>s</sub>	Setup Time D to CK	3.3 <sup>(*)</sup>			6.0			7.0		7.0		nc
	HIGH or LOW	5.0 <sup>(**)</sup>			5.0			5.0		5.0		ns
t <sub>h</sub>	Hold Time D to CK	3.3 <sup>(*)</sup>			0.5			0.5		0.5		nc
	HIGH or LOW	5.0 <sup>(**)</sup>			0.5			0.5		0.5		ns
$t_{REM}$	Removal Time	3.3 <sup>(*)</sup>			5.0			5.0		5.0		ns
	PR or CLR to CK	5.0 <sup>(**)</sup>			3.0			3.0		3.0		110
$f_{MAX}$	Maximum Clock	3.3 <sup>(*)</sup>	15		80	125		70		70		
	Frequency	3.3 <sup>(*)</sup>	50		50	75		45		45		MHz
		5.0 <sup>(**)</sup>	15		130	170		110		110		IVII IZ
<u> </u>		5.0 <sup>(**)</sup>	50		90	115		75		75		

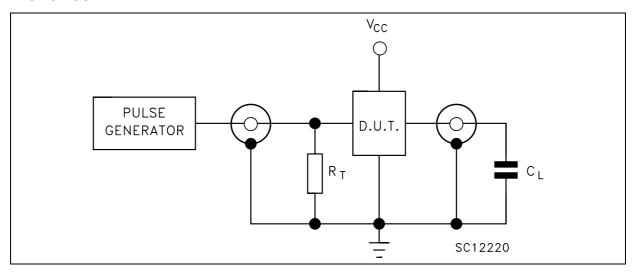
<sup>(\*)</sup> Voltage range is  $3.3V \pm 0.3V$  (\*\*) Voltage range is  $5.0V \pm 0.5V$ 

### **CAPACITIVE CHARACTERISTICS**

Symbol	Parameter	Test Condition		Value							
		V <sub>CC</sub>		T <sub>A</sub> = 25°C		-40 to 85°C		-55 to 125°C		Unit	
		(V)		Min.	Тур.	Max.	Min.	Max.	Min.	Max.	
C <sub>IN</sub>	Input Capacitance	3.3			4	10		10		10	pF
C <sub>PD</sub>	Power Dissipation Capacitance (note 1)	3.3	f <sub>IN</sub> = 10MHz		22						pF

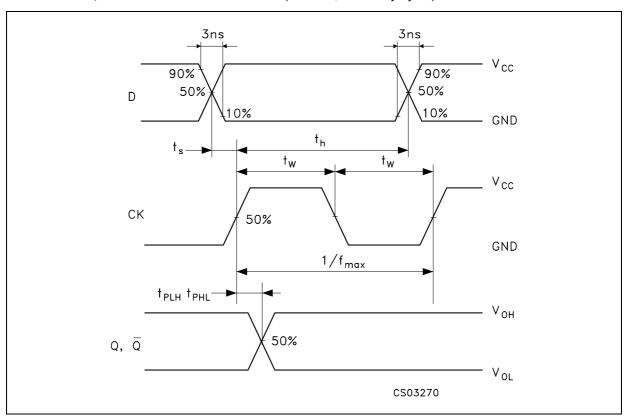
<sup>1)</sup>  $C_{PD}$  is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation.  $I_{CC(opr)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}$ 

### **TEST CIRCUIT**

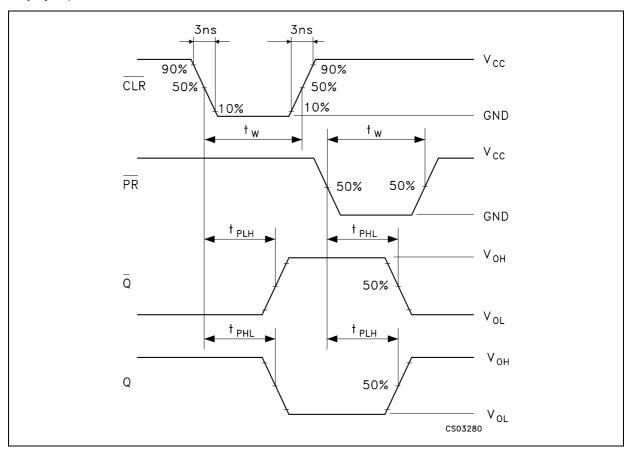


 $\rm C_L$  =15/50pF or equivalent (includes jig and probe capacitance)  $\rm R_T$  =  $\rm Z_{OUT}$  of pulse generator (typically 50 $\Omega)$ 

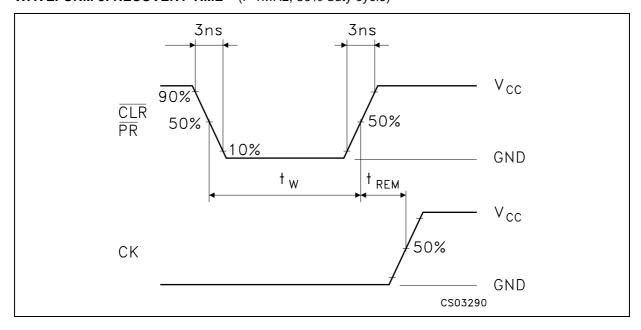
WAVEFORM 1: PROPAGATION DELAYS, SETUP AND HOLD TIMES (D TO CK), CK MAXIMUM FREQUENCY, CK MINIMUM PULSE WIDTH (f=1MHz; 50% duty cycle)



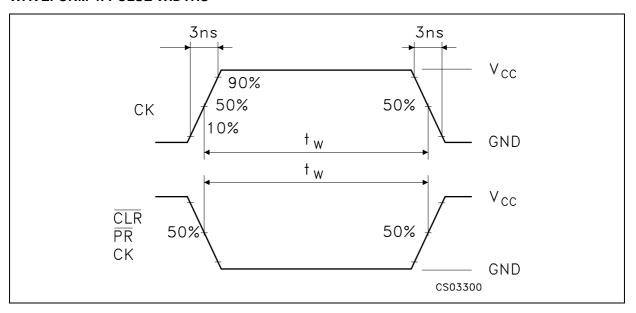
WAVEFORM 2: PROPAGATION DELAYS MINIMUM PULSE WIDTH ( $\overline{\text{CLR}}$  AND  $\overline{\text{PR}}$ ) (f=1MHz; 50% duty cycle)



**WAVEFORM 3: RECOVERY TIME** (f=1MHz; 50% duty cycle)

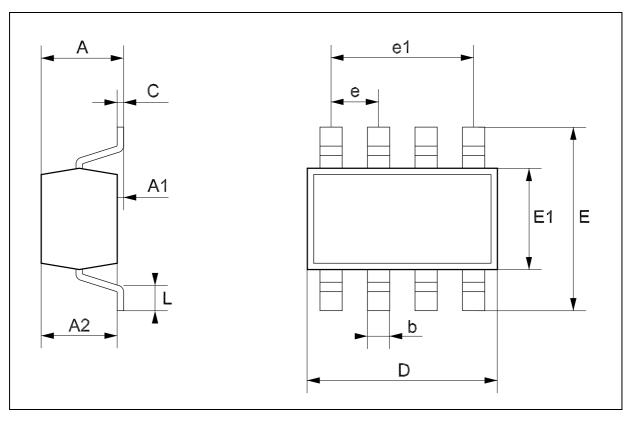


## **WAVEFORM 4: PULSE WIDTHS**



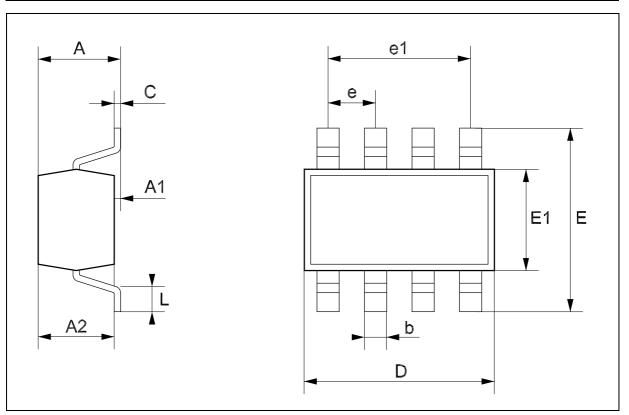
## **SOT23-8L MECHANICAL DATA**

DIM		mm.		mils			
DIM.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.	
А	0.90		1.45	35.4		57.1	
A1	0.00		0.15	0.0		5.9	
A2	0.90		1.30	35.4		51.2	
b	0.22		0.38	8.6		14.9	
С	0.09		0.20	3.5		7.8	
D	2.80		3.00	110.2		118.1	
E	2.60		3.00	102.3		118.1	
E1	1.50		1.75	59.0		68.8	
е	0	.65			25.6		
e1		1.95			76.7		
L	0.35		0.55	13.7		21.6	



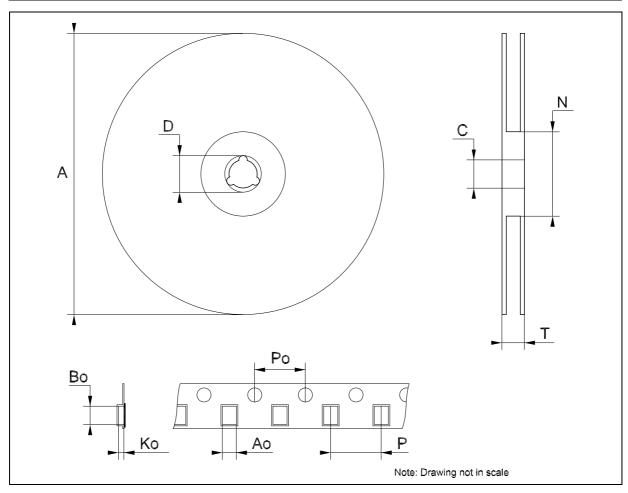
## **SOT323-8L MECHANICAL DATA**

DIM		mm.		mils				
DIM.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.		
А	0.80		1.10	31.5		43.3		
A1	0.00		0.10	0.0		3.9		
A2	0.80		1.00	31.5		34.9		
b	0.13		0.28	5.1		11.0		
С	0.10		0.18	3.9		7.1		
D	1.80		2.20	70.9		86.6		
E	1.80		2.40	70.9		94.5		
E1	1.15		1.35	45.3		53.1		
е		0.5			19.7			
e1		1.5			59.0			
L	0.10		0.30	3.9		11.8		



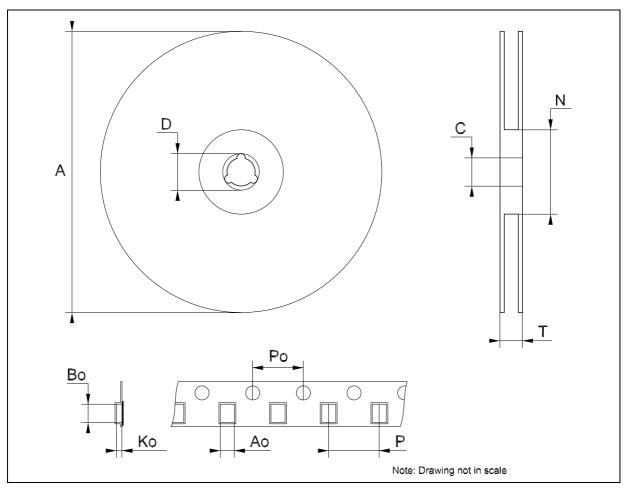
# Tape & Reel SOT23-xL MECHANICAL DATA

DIM.		mm.		inch			
DIN.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.	
А			180			7.086	
С	12.8	13.0	13.2	0.504	0.512	0.519	
D	20.2			0.795			
N	60			2.362			
Т			14.4			0.567	
Ao	3.13	3.23	3.33	0.123	0.127	0.131	
Во	3.07	3.17	3.27	0.120	0.124	0.128	
Ko	1.27	1.37	1.47	0.050	0.054	0.0.58	
Po	3.9	4.0	4.1	0.153	0.157	0.161	
Р	3.9	4.0	4.1	0.153	0.157	0.161	



Tape	& R	eel SOT	<sup>-</sup> 323-xL	<b>MECH</b>	ANICAL	DATA
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DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
А	175	180	185	6.889	7.086	7.283
С	12.8	13	13.2	0.504	0.512	0.519
D	20.2			0.795		
N	59.5	60	60.5		2.362	
Т			14.4			0.567
Ao		2.25			0.088	
Во		2.7			0.106	
Ko		1.2			0.047	
Ро	3.98	4	4.2	0.156	0.157	0.165
Р	3.98	4	4.2	0.156	0.157	0.165



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